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ENTERGY CORPORATION

v.

ENVIRONMENTAL PROTECTION AGENCY, *et al.*

PSEG FOSSIL LLC AND PSEG NUCLEAR LLC

v.

RIVERKEEPER, INC., *et al.*

UTILITY WATER ACT GROUP

v.

RIVERKEEPER, INC., *et al.*

ON WRITS OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE SECOND CIRCUIT

BRIEF FOR THE NUCLEAR ENERGY INSTITUTE AS AMICUS CURIAE SUPPORTING PETITIONERS

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INTEREST OF AMICUS CURIAE

The Nuclear Energy Institute (NEI) represents the commercial nuclear energy industry on regulatory matters.[1] NEI's members include every entity licensed by the Nuclear Regulatory Commission (NRC) to generate electricity at a commercial nuclear power plant in the United States. Members also include nuclear plant designers, major architecture and engineering firms, fuel fabrication facilities, and other organizations and individuals involved in the nuclear energy industry.

This Court's interpretation of Section 316(b) of the Clean Water Act (CWA) in these cases could significantly affect most, if not all, of the 38 U.S. nuclear power plants that do not currently use "closed-cycle" cooling water systems. NEI can offer the Court an informed perspective on the statutory issue presented and on the likely practical consequences of an incorrect interpretation of Section 316(b).

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[1] No counsel for a party authored this brief in whole or in part, and no party or its counsel made a monetary contribution intended to fund the preparation or submission of this brief. Petitioners PSEG Nuclear LLC and Entergy Corporation, and certain members of petitioner Utility Water Act Group with nuclear plants, are members of NEI and make contributions that support all of NEI's activities, including the filing of amicus briefs. No person other than NEI, its members, or its counsel made a monetary contribution to the preparation or submission of this brief. Letters from all parties either consenting generally to the filing of amicus curiae briefs in these cases or consenting specifically to the filing of this brief have been filed with the Court.

INTRODUCTION AND SUMMARY OF ARGUMENT

Nuclear power facilities are an integral part of our nation's energy production infrastructure. Nuclear plants supply one-fifth of the country's electricity, and the reliability of nuclear power makes it critical to the functioning of the electrical grid. Moreover, the low variability of nuclear power prices and supply has a stabilizing effect on the market for electricity generally. Of particular importance in light of concerns about global climate change, nuclear power plants emit no greenhouse gases.

Refusing to defer to the longstanding interpretation by the Environmental Protection Agency (EPA) of its statutory authority, the court of appeals read Section 316(b) of the Clean Water Act to foreclose the agency from comparing costs to benefits in determining what is, under particular circumstances, "the best technology available for minimizing [the] adverse environmental impact" caused by cooling water intake structures at existing large power plants. 33 U.S.C. § 1326(b). The court would have permitted the EPA to consider the cost of implementing a particular technology in only very limited respects—principally, to determine whether it could "reasonably [be] borne" by the industry as a whole. Pet. App. 24a-26a.[2]

At a minimum, Section 316(b) permits the EPA to consider any adverse impact that adoption of a particular technology would have on the environment gener-

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[2] Citations to "Pet. App." refer to the Appendix to the Petition for a Writ of Certiorari filed by Entergy Corporation in No. 07-588.

ally and on the nation's energy supply. By its terms, the provision calls for the EPA to require adoption of the "best" technology available (BTA) to minimize "adverse environmental impact[s]" across the board. This language readily permits consideration of energy supply impacts and environmental impacts beyond just those involving impingement or entrainment of aquatic life at the intake location.

In the case of nuclear power, this means that the EPA must be permitted to consider the costs of implementing particular technologies at individual plants in order to assess how requiring those technologies would itself affect both the energy supply and the environment, including by potentially forcing plant closures. Nuclear power plays a particularly important role in maintaining the nation's baseload power supply and is a key technology for combating global climate change. If existing nuclear plants are forced to close, either temporarily or permanently, in the near and medium term, their power output could realistically be replaced, if at all, only by plants that burn fossil fuels.

Mandating the adoption of closed-cycle cooling by existing plants likely would lead to the closure of some nuclear plants. Retrofitting existing nuclear plants to use closed-cycle cooling would be exceedingly expensive, if feasible at all, and would entail its own environmental costs. Individual nuclear plant owners have estimated that retrofitting closed-cycle cooling systems at particular plants could cost $ 1 billion or more. For some plants, the high cost of retrofitting closed-cycle cooling could make shutting down the only economically feasible option. In order adequately to consider the impacts on the environment and the supply of energy of selecting closed-cycle cooling as BTA, the EPA necessarily must be permitted to consider both the environ-

mental and fiscal costs of implementing that technology.

Because the adverse environmental and energy supply impacts of closing individual nuclear plants are so significant, it is also important that the EPA have the discretion to weigh these costs against the benefits that might be obtained from adopting a particular technology at a *specific site*. The court of appeals foreclosed any case-by-case or site-by-site cost/benefit analysis. This Court should reject any such limitation on the EPA's implementation of Section 316(b).

ARGUMENT

I. NUCLEAR PLANTS PROVIDE CRITICAL BASELOAD POWER WITH IMPORTANT ENVIRONMENTAL ADVANTAGES

The supply of power in the United States is under strain. In some regions, supply at times barely meets demand. During the summer of 2006, for example, a heat wave "required utility system operators, customers, and government agencies to implement emergency procedures in some areas." North American Electric Reliability Corporation (NERC), *2006 Long Term Reliability Assessment: The Reliability of Bulk Power Systems in North America* 5 (Oct. 2006), *available at* http://www.nerc.com/~filez/rasreports.html.[3] Blackouts

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[3] NERC is the entity certified by the Federal Energy Regulatory Commission as the single "Electric Reliability Organization" for the United States under Section 215 of the Federal Power Act, 16 U.S.C. § 824o(c). *See* FERC, *Order Certifying North American Electric Reliability Corporation as the Electric Reliability Organization and Ordering Compliance Filing*, 116 FERC ¶ 61,062 (July 20, 2006).

were avoided principally "because generating capacity performed extremely well during this period." *Id.*

The problem is likely to get worse before it gets better. Over the next ten years, the utility industry expects peak demand to increase by over 17%, while committed generating capacity is expected to increase by only 8.4%. NERC, *2007 Long Term Reliability Assessment: The Reliability of Bulk Power Systems in North America* 10 (Oct. 2007) (2007 NERC Assessment), *available at* http://www.nerc.com/~filez/rasreports.html. In a number of regions, capacity margins are expected to drop well below target levels. *Id.* at 24.

Against this backdrop, nuclear power plants are an exceedingly important source of power. There are currently 104 operating units at more than 60 nuclear plant sites in the United States. These plants generate approximately 20% of the nation's electricity.[4] Along with coal and natural gas, nuclear energy is a foundational part of the nation's power supply.

Nuclear power is a particularly important source of generation because of its cost stability and output reliability. The supply and cost of nuclear power do not fluctuate significantly based on weather or climate conditions, fuel costs, or the availability of imported supplies. Nuclear plants are able to operate without interruption for extended periods—up to 24 months at a time. As a result, nuclear power is an important component of the "baseload" electrical power generation

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[4] *See* Comments of the Nuclear Energy Institute, Comment ID 316bEFR.020.002, at 407. The comments cited in this brief are available in http://www.epa.gov/waterscience/316b/phase2/comments/author-ph2.pdf. The page citations provided are to this compilation of the comments arranged by author.

that is necessary for the national electric power grid to function. Indeed, the stability of the grid depends on nuclear power.

Nuclear energy is also comparatively inexpensive. Nuclear plants are currently estimated to be the lowest-cost producers of baseload electricity.[5] The consistent availability of nuclear power at predictable prices also has a stabilizing effect on the electricity market as a whole.

Nuclear power also has important environmental advantages over other forms of energy production. As this Court has recognized, the world faces serious threats from global climate change. *See Massachusetts v. EPA*, 127 S. Ct. 1438, 1455-1456 (2007). The United Nations Intergovernmental Panel on Climate Change (IPCC), which in 2007 shared the Nobel Peace Prize for its work on global warming, has concluded that "[w]arming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level."[6] "Average Northern Hemisphere temperatures during the second half of the 20th century were *very likely* higher than during any other 50-year period in

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[5] *See U.S. Nuclear Power Plants Set Record Highs For Electricity Production, Efficiency in 2007* (Feb. 6, 2008), *available at* http://www.nei.org/newsandevents/newsreleases/setrecordhighs/.

[6] *Summary for Policymakers of the Synthesis Report of the IPCC Fourth Assessment Report* 2 (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf.

the last 500 years and *likely* the highest in at least the past 1300 years."[7]

Many believe that climate change is caused in significant part by the emission of greenhouse gases, including carbon dioxide.[8] It has been estimated that in 2004 about one-quarter of global greenhouse gas emissions were from energy production.[9] Nuclear power plants, however, emit no greenhouse gases. Nuclear plants—not other alternative sources—generate more than 70% of all carbon-free electricity in America.[10] By contrast, hydropower and solar, wind, and geothermal sources together account for less than 30%. Increased electricity production by nuclear power plants was responsible for over one-third of all voluntary greenhouse gas reductions reported by the electric power sector in 2005. It is estimated that using nuclear power instead of fossil-fuel-burning power plants prevented 681 million metric tons of carbon dioxide emissions in 2006. The volume of greenhouse gas emissions avoided by the use of nuclear power in the United States is equivalent to taking more than 95% of all passenger cars off the

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[7] *Id.*

[8] *Id.* at 5 ("Most of the observed increase in global average temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic [greenhouse gas] concentrations.").

[9] *Id.*

[10] The factual points in the remainder of this paragraph are drawn from a more detailed discussion, *Nuclear Energy Plays Essential Role in Reducing Greenhouse Gas Emissions*, available on NEI's website at http://www.nei.org/resourcesandstats/documentlibrary/protectingtheenvironment/policybrief/nuclearenergyreducinggreenhousegasemissions/.

nation's roadways. Globally, the use of nuclear energy prevents the emission of more than 2.6 billion metric tons of carbon dioxide each year.[11]

For these reasons, the United Nations IPCC in its Fourth Assessment Report listed "nuclear power" as a "key" technology for mitigating greenhouse gas emissions—a technology, importantly, that is "currently commercially available."[12] It has also concluded that "[n]uclear power is . . . an effective [greenhouse gas] mitigation option."[13]

II. SECTION 316(b) PERMITS THE EPA TO CONSIDER THE EFFECT OF IMPLEMENTATION COSTS ON INDIVIDUAL PLANTS IN DETERMINING BTA

Section 316(b) of the Clean Water Act directs the EPA to "require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." 33 U.S.C. § 1326(b). As explained by petitioners and the government, this provision permits the EPA to conduct cost-benefit analysis

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[11] Even when greenhouse gas emissions are analyzed for the entire life cycle of a nuclear power plant—from uranium mining to electricity production to used fuel management—nuclear energy is comparable to solar, wind, and hydropower sources.

[12] *Summary for Policymakers of the Synthesis Report of the IPCC Fourth Assessment Report* 17.

[13] *Climate Change 2007: Mitigation, Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* 269 (Cambridge Univ. Press 2007), *available at* http://www.mnp.nl/ipcc/pages_media/AR4-chapters.html; *see also id.* ("Total life-cycle [greenhouse gas] emissions per unit of electricity produced from nuclear power are . . . similar to those for renewable energy sources.").

in determining BTA. The language, structure, and legislative history of Section 316(b) unambiguously authorize such an analysis. *See* Br. for Petitioners Entergy Corp., PSEG Fossil LLC, and PSEG Nuclear LLC 31-52.[14] Moreover, as explained in detail below, at a minimum, Section 316(b) allows the EPA to consider the environmental and energy costs of retrofitting a proposed technology, including those that would result if the high cost of retrofitting led to nuclear plant closures.

A. Section 316(b) Permits Consideration Of All Adverse Environmental Impacts, Not Just Effects On Aquatic Life, And Of Effects On Energy Supply

1. Section 316(b) instructs the EPA to determine "the best technology available for minimizing *adverse environmental impact*." 33 U.S.C. § 1326(b) (emphasis added). The term "adverse environmental impact" is not separately defined. Its plain meaning is not limited to impacts on aquatic life. Rather, the term encompasses the whole range of potential adverse environmental impacts related to the adoption of a particular technology.

Section 316(b)'s reference to Sections 301 and 306 of the CWA reinforces this conclusion. The provisions relied upon by the court of appeals, which address the "best available technology" (BAT) and "best available demonstrated control technology" (BADT) standards,

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[14] Even if the provision were deemed not to unambiguously permit cost-benefit analysis, it surely does not unambiguously foreclose such an analysis. *See* Br. of Petitioner Utility Water Act Group 31-37; Br. for the Federal Parties as Respondents Supporting Petitioners 15-26.

expressly permit the EPA to consider "non-water quality environmental impact" in determining the relevant effluent reduction technologies. *See* 33 U.S.C. §§ 1311(b)(2)(A) (referencing § 1314(b)(2)), 1314(b)(2)(B), 1316(B)(1)(b).

The EPA's interpretation of "adverse environmental impact" is consistent with its plain meaning. In the rulemaking at issue here, the EPA concluded that, although it was focusing primarily on impingement and entrainment of aquatic life, it could consider air quality impacts in setting BTA:

> [T]he net effect [of the energy penalty] would be more consumption of fossil fuel, which in turn increases the emission of sulfur dioxide, NO_x, particulate matter, mercury, and carbon dioxide. Increasing fuel consumption at existing coal power plants yields the largest increase in air emissions because existing systems are less efficient at producing power (and therefore burn more coal) and because they generally have less air pollution control equipment in place. *EPA believes that it is reasonable to consider these non-water quality environmental impacts* . . . in making today's decision.

National Pollutant Discharge Elimination System—Final Regulations To Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities, 69 Fed. Reg. 41,576, 41,605 (July 9, 2004) (Phase II Rulemaking) (emphasis added). This interpretation of the Act extends to other non-water quality impacts, and it is entitled to deference, *see Chevron U.S.A. Inc.* v. *Natural Res. Def. Council, Inc.*, 467 U.S. 837, 842-843 (1984).

The court of appeals itself recognized that, at least in some circumstances, "the EPA could rely on factors other than impingement and entrainment in establishing BTA, such as negative environmental impacts." Pet. App. 37a; *see also id.* at 26a n.12 (permitting consideration of "energy efficiency or environmental impact").[15] But as explained below, in order to consider other adverse environmental impacts, the EPA must consider the costs of implementing different technologies—an inquiry the court of appeals seemingly has forbidden except in very narrow circumstances. Thus, although the court of appeals correctly interpreted Section 316(b) to permit the EPA to undertake a broad inquiry into potential adverse environmental effects, its insistence that the agency forego cost-benefit analysis threatens to preclude that very inquiry.

2. Section 316(b) also permits the EPA to consider the impact that selection of a particular technology would have on the nation's supply of energy. The provision does not directly address effects on energy supply, but its mandate that the EPA select the "best" technology for "minimizing adverse environmental impact" readily permits consideration of energy supply impacts. Considerations of energy supply are inherently linked to considerations of environmental impact, since most means of generating energy—and certainly those that can replace short-term energy shortfalls—affect the environment. Moreover, given the extreme

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[15] Likewise, in *Riverkeeper, Inc.* v. *EPA*, 358 F.3d 174 (2d Cir. 2004) (*Riverkeeper I*), the court held that "the Clean Water Act allows the EPA to make a choice among alternatives based on more than impingement and entrainment," *id.* at 196, and affirmed the EPA's consideration of, among other things, "undesirable air emissions," *id.* at 194-195.

importance of maintaining an adequate, stable supply of electricity, the effect of a given technology on the nation's electricity supply is an important consideration when determining the "best" technology.

This conclusion is further buttressed by Sections 301 and 306 of the Act. Although the provisions governing BAT and BADT do not expressly address cost/benefit weighing, they do expressly permit the EPA to consider "energy requirements" in adopting effluent reduction technologies. *See* 33 U.S.C. §§ 1314(b)(2)(B), 1316(B)(1)(b).

The EPA has interpreted Section 316(b) to permit consideration of impacts on energy supply in selecting the BTA for existing plants. In rejecting mandatory retrofitting of closed-cycle cooling, the EPA stated:

> Another issue concerns the energy impacts of cooling towers. EPA examined the information it received after publication of the proposed rule and [Notice of Data Availability], and agrees that the energy penalty associated with cooling towers, together with other factors, indicates that this technology is not the best technology available *for existing facilities* for minimizing adverse environmental impacts associated with cooling water intake structures.

69 Fed. Reg. at 41,605 (emphasis added); *compare National Pollutant Discharge Elimination System: Regulations Addressing Cooling Water Intake Structures for New Facilities*, Final Rule, 66 Fed. Reg. 65,256, 65,259-65,260 (Dec. 18, 2001) (requiring closed-cycle cooling or its equivalent at new facilities). Again, this interpretation is subject to deference under *Chevron*.

The court of appeals acknowledged that Section 316(b) permits consideration, at least in some circumstances, of impacts on energy supply. Pet. App. 37a.[16] But, as illustrated below, the court of appeals' limitation on the EPA's ability to consider the costs of implementing different cooling water intake structure technologies calls into question the agency's ability adequately to consider energy supply impacts.

B. Adverse Environmental And Energy Supply Impacts Could Result From Nuclear Plant Closures Caused By The High Cost Of Retrofitting Closed-Cycle Cooling As Well As The Retrofitting Itself

As NEI noted in its brief in support of certiorari, retrofitting existing nuclear plants to use closed-cycle cooling is at best a complicated, costly, and time-consuming process, which might not be economically feasible at some plants.[17] Mandating the use of closed-

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[16] *See also id.* at 26a n.12 ("[T]he Agency may also depart from this performance benchmark because of other permissible considerations aside from cost, for instance, energy efficiency . . . ."); *Riverkeeper I*, 358 F.3d at 194-196 (upholding selection of BTA in part based on consideration of energy efficiency).

[17] If the EPA is foreclosed from considering the costs of implementing proposed technologies except in the limited respects permitted by the court of appeals, respondents will almost certainly contend that the agency must mandate adoption of closed-cycle cooling. The EPA has already determined that retrofitting plants to use closed-cycle cooling generally will reduce impingement and entrainment to a greater degree than upgrading the design and construction of water intake structures at once-through plants. *See* 69 Fed Reg. at 41,606. While the reductions achievable using other technologies "approach[]" those from closed-cycle cooling, respondents will surely argue that they are not "essentially the same" in the only sense that the court of appeals would recognize as allowing selection of the lower-cost alternative. *See* Pet.

cycle cooling at all existing nuclear plants would have its own environmental costs—due in part to decreased plant efficiency and extended plant closures—and could further decrease the nation's supply of energy and harm the environment by forcing some nuclear plants to shut down permanently.

1. Retrofitting large existing plants to use closed-cycle cooling would pose significant fiscal and engineering challenges. Among other things, closed-cycle cooling requires an extensive network of pipes to circulate water to and from the plant's condensers. For example, it is estimated that retrofitting the Salem Generating Station to use closed-cycle cooling would require the demolition or abandonment of over three miles of existing 7-foot and 10-foot diameter circulating water pipe and the installation of over 4 miles of new 7-foot pipe. *See, e.g.*, Comments of UWAG, Comment ID 316bEFR.041.351, at 1330. Additionally, many plants would need to reinforce their condensers to withstand the increased pressure resulting from closed-cycle cooling and otherwise modify them for use with the retrofitted system.

In addition, in order to make the changes necessary to convert to closed-cycle cooling, plants would need to shut down for what could be prolonged periods of time. The EPA estimated that plants would be unavailable for as long as 10 months. *See* 69 Fed. Reg. at 41,605. Private estimates suggest that retrofitting the Diablo

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App. 26a, 28a, 34a n.16, 36a. If that is correct, the court of appeals' decision, if affirmed, would require the EPA to mandate retrofitting of all existing plants to use closed-cycle cooling, so long as the billions of dollars that retrofitting would cost could theoretically be borne by the industry as a whole.

Canyon and San Onofre nuclear power plants would render them unavailable for 12 months or more, that the Indian Point nuclear power plant would be closed for approximately 10 months, and that the Oyster Creek nuclear power plant would have to be shut down for more than four months. Extended outages would also be anticipated at the Salem nuclear power plant. *See* PSEG Pet. 34 (estimating that a closed-cycle retrofit "would require partially suspending operations for at least 14 months, causing a net loss of 1150 megawatts . . . during that period"). Shutdowns of this sort impose substantial costs on plant owners.

Even once returned to operation, retrofitted plants would inevitably produce less usable power than they did before they were converted to use closed-cycle cooling. A steam power plant's condenser "operates under vacuum conditions (i.e. a pressure below normal atmospheric pressure)." Comments of Department of Energy, Comment ID 316bEFR.010.101, at 239. Because cooling water in once-through systems has on average a lower temperature than water in closed-cycle cooling systems, the vacuum created in once-through systems is greater than in closed-cycle systems, which increases efficiency. *Id.* In addition, plants using closed-cycle cooling require more power to run the cooling system itself, leaving less for consumers.

In its Phase II Rulemaking, the EPA relied on an estimate by the Department of Energy (DOE) that the "energy penalty" resulting from converting existing once-through plants to closed-cycle cooling would generally amount to a 2.4% to 4.0% decline in energy production capacity. 69 Fed. Reg. at 41,605. The EPA noted a 5.3% energy penalty associated with the use of closed-cycle cooling for one nuclear plant that provides 78% of the electricity for Vermont. *See id.* Using the

same DOE figures relied upon by the EPA, it has been estimated that retrofitting all existing nuclear plants to use closed-cycle cooling would reduce overall capacity by 2,117 megawatts. As the EPA explained with respect to both nuclear and non-nuclear plants, "on average 20 additional 400-MW plants might have to be built to replace the generating capacity lost by replacing once-through cooling systems with wet cooling towers if such towers were required by all Phase II facilities." *Id.* The energy penalty imposed by closed-cycle cooling is yet another cost that would have to be borne if plants were required to retrofit closed-cycle cooling.

Additionally, in order to retrofit closed-cycle cooling, some plants would need to acquire land on which water cooling towers could be built. In rejecting mandatory closed-cycle retrofits, the EPA noted that "31 out of 56 plants surveyed said that they would need to acquire additional property to accommodate cooling towers." 69 Fed. Reg. at 41,605. For some plants, finding and using land for cooling towers would present daunting challenges—both fiscal and environmental. For example, retrofitting the Diablo Canyon plant on the central California coast, if it could be done at all, would require excavating a 1600-foot by 600-foot section of the Las Cañadas coastal hills adjacent to the plant to make room for the construction of 132 60-foot-tall water tower cells.[18] Retrofitting the San Onofre plant, on the coast between San Diego and Los Angeles, likely would require construction of cooling water tanks at the top of 100-foot bluffs overlooking the beach adjacent to the plant. Acquiring or developing land for

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[18] Unless otherwise indicated, examples in this brief are drawn from information provided by plant operators.

water cooling towers thus could impose significant costs.

Finally, some existing plant owners likely would need to acquire federal, state, and possibly local permits to proceed with retrofitting. Some retrofits, for instance, would require a license amendment from the NRC, which requires a formal approval process generally involving public hearings. *See* 10 C.F.R. § 50.91.[19] Obtaining such amendments would consume substantial NRC and private resources. Efforts to obtain the permits necessary to address what the court of appeals viewed as the fish-protection requirements of the Clean Water Act could well be hampered by adverse environmental impacts of other sorts that might result from retrofitting plants to use closed-cycle cooling. For example, salt-water cooling towers produce large plumes of salt water vapor that can contribute to salt contamination, fogging, and icing in the surrounding area and affect nearby electrical equipment. It is also anticipated that mandating construction of cooling towers would generate concern about increased noise. The prospect of extensive construction in sensitive areas, such as around the coastal Diablo Canyon and San Onofre plants, would raise substantial additional concerns that could delay or even preclude obtaining necessary approvals. As the EPA noted, expanding some plants might require displacement of ecologically valuable lands. 69 Fed. Reg. at 41,605. The San Onofre plant,

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[19] A license amendment is required if a proposed change to a nuclear plant involves, among other things, a modification to technical specifications. *See id.* § 50.59(c)(1)(i). Whether retrofitting to use closed-cycle cooling would require a license amendment would be a plant-specific determination.

for example, is surrounded by federal and state lands that support species protected by state and federal laws.

In addition to possible adverse effects on the land and air surrounding plants, retrofitting could adversely affect the very water resources protected by the Clean Water Act. Although a closed-cycle cooling system at a nuclear plant does not take in as much water from the natural source day-to-day as a once-through system, it actually *consumes* (that is, permanently removes from the source water body) up to 80% *more* water overall. *See Water & Sustainability (Volume 3): U.S. Water Consumption for Power Production—The Next Half Century* viii (Elec. Power Research Inst. 2002). Moreover, efforts to obtain permits for retrofits—despite these environmental impacts—would occur at a time when the NRC and industry are concentrating on applications to renew operating licenses at existing nuclear plants and on licensing and constructing new plants that are necessary to meet the expanding demand for power.

In the face of these substantial potential obstacles, the EPA recognized that, in some instances, retrofitting nuclear plants to use closed-cycle cooling would be prohibitively expensive:

> [A] national requirement to retrofit existing systems is not the most cost-effective approach and at many existing facilities, retrofits may be impossible or not economically practicable. EPA estimates that the total capital costs for individual high-flow plants (i.e., greater than 2 billion gallons per day) to convert to wet towers generally ranged from $130 to $200 million,

> with annual operating costs in the range of $4 to $20 million . . . .

69 Fed. Reg. at 41,605.

Moreover, the EPA acknowledged that, for a variety of reasons, even its substantial cost estimates might "not fully reflect the costs of the option." 69 Fed. Reg. at 41,605. Indeed, forecasts by individual plant operators run higher than the EPA's estimates. The Edison Electric Institute, the association of U.S. shareholder-owned electric companies, has estimated that retrofitting the 38 existing nuclear plants that do not use closed-cycle cooling would cost between $10 billion and $19 billion.[20] Estimates of the cost of retrofitting all existing once-through plants with closed-cycle cooling submitted to the EPA by petitioner Utility Water Act Group ranged from $40 to $66 billion. *See* UWAG Pet. 37. Using the high end of the EEI range, the average cost per nuclear plant would be $500 million. For each of four plants—Diablo Canyon, Salem Generating Station, San Onofre, and Indian Point—EEI or plant owners estimate that the cost of retrofitting could total $1 billion or more. At Diablo Canyon alone, retrofitting could cost in the range of $2.4 billion.

In light of the significant cost of retrofitting closed-cycle cooling, if the EPA mandates such retrofitting at all existing nuclear power plants, some of those plants could well find it economically impossible to continue operation.

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[20] This range is derived from cost estimates submitted to the EPA adjusted with some site-specific cost estimates provided by individual operators.

2. Any closures of nuclear plants due to the high cost of retrofitting closed-cycle cooling would have adverse effects on the nation's energy supply and on the environment.

First, the loss of generating capacity from nuclear plants that are forced to close would have a significant adverse impact on the nation's overall supply of power. While the lost capacity might eventually be replaced, in the short term, air quality limitations would likely prevent fossil-fuel plants from attempting to meet the entire shortfall, and existing nuclear plants lack additional capacity. In areas of the country already facing energy constraints, such as California and the mid-Atlantic/Northeast corridor, the near-term reduction in capacity would increase the likelihood of brownouts and blackouts during the summer months. Thus, in its comments to the EPA, petitioner Entergy estimated that if its Indian Point nuclear plant were to close, target reserve margins in New York could not be met and "the calculated number of days where emergency measures would be taken to prevent blackouts, etc., would rise by 800%." Comments of Goodwin Procter (submitted on behalf of Entergy Corp.), Comment ID 316bEFR.029.035, at 619.[21]

NERC has recognized that mandating closed-cycle cooling could adversely affect the nation's power capacity margins In its 2007 reliability report, NERC explained:

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[21] Even temporary plant closures to allow retrofitting would have a significant impact. Because of their length, the anticipated closures would likely overlap with the winter or summer peak electricity demand seasons, threatening the reliability of the power grid.

> While plant specific outcomes will vary, retrofitting existing power plants with cooling towers can reduce the capacity of those plants, which will exacerbate the supply concerns identified in ... this assessment. In some cases, retrofits may prove so costly that plants are retired earlier than projected, with the consequent loss of the plant's entire capacity. At a time when additional electricity generating resources are needed, the loss of existing generating capacity would undermine U.S. efforts to meet the growing demand for electricity.

2007 NERC Assessment 12.[22] For this reason, during the Phase II Rulemaking the DOE "strongly" recommended that the EPA not require all existing plants to be retrofitted to use closed-cycle cooling. Comments of Department of Energy, Comment ID 316bEFR.010.028, at 185.

Second, the closure of nuclear plants required to retrofit closed-cycle cooling would have significant adverse environmental effects. Over the short and medium term, new nuclear plants cannot realistically replace power lost due to closures of nuclear plants. Designing a new nuclear plant, obtaining necessary permits, and building the plant takes years. New nuclear projects already in early stages of development are not expected to begin production until 2015 to 2020. Thus, as a practical matter, for at least several years, generating capacity lost from existing nuclear plants would

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[22] *See also id.* at 97 ("Besides the de-rating of existing units, the costs of retro-fitting cooling towers for many older plants may be prohibitive and some may be retired potentially jeopardizing resource adequacy in many regions of the U.S.").

have to be replaced—to the extent it can be replaced at all given constraints on existing plants—largely by power generated using fossil fuels.

The EPA understood that requiring retrofitting would result in increased reliance on fossil fuels. *See, e.g.*, 69 Fed. Reg. at 41,605. That, in turn, would increase "the emission of sulfur dioxide, NO_x, particulate matter, mercury and carbon dioxide." *Id.* It is estimated that using fossil fuels to replace the nuclear power lost due to the retrofitting energy penalty alone could add 37,000 tons of sulfur dioxide, 13,000 tons of nitrogen oxide, and 14 million metric tons of carbon dioxide to the nation's atmosphere annually.[23] To the extent power from fossil-fuel plants also replaces capacity lost as a result of nuclear plant closures, the increase in greenhouse gas emissions would be even more severe.

III. The EPA Is Permitted To Weigh Costs Against Benefits On A Case-By-Case And Site-By-Site Basis

Because of the substantial negative effects that closing nuclear plants would have on the environment and the nation's energy supply, it is important that the EPA be permitted not only to weigh costs against benefits generally but also to do so on a case-by-case and site-by-site basis. "EPA and State permitting authorities have been implementing CWA section 316(b) on a case by case basis for over 25 years." 69 Fed. Reg. at 41,626. The Phase II rules continue this practice in part by permitting a facility to obtain a site-specific assessment of BTA by demonstrating "that its costs would be significantly greater than the benefits of com-

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[23] Carbon dioxide typically is measured in metric tons, which are equivalent to approximately 2205 lbs.

plying with such performance standards at the facility." *Id.* at 41,603; *see also* 40 C.F.R. § 125.94(a)(5).

The court of appeals rejected the agency's site-specific cost-benefit provision primarily for two reasons: (1) because it concluded that any cost-benefit comparison was improper, and (2) because the provision supposedly "impermissibly authorizes the EPA to consider the degraded quality of waterways in selecting a site-specific BTA." Pet. App. 58a. This Court should make clear that, to the contrary, the EPA may weigh costs against benefits on a case-by-case basis.

The text of Section 316(b) provides no indication that the agency was acting contrary to its authority for almost 30 years when it made determinations of BTA solely on a case-by-case basis. At most, Section 316(b) is silent as to whether the EPA should promulgate uniform national standards or make case-by-case determinations. In fact, the provision's instruction that the EPA determine the optimal "location" of cooling water intake structures—which is almost certain to vary from place to place—supports the EPA's position that case-by-case and site-by-site determinations of BTA are permitted.

The court of appeals believed that case-by-case determinations of BTA are not permitted because in 1972 Congress "changed its approach" to regulating *effluents* under the CWA. The court noted that the provisions of the CWA addressing effluents "now regulate[] discharges from point sources rather than water quality." Pet. App. 58a. But that observation is beside the point. In contrast to the effluent reduction provisions, Section 316(b) requires the EPA to mandate use of the best technology available to minimize "*adverse envi-*

ronmental impact." 33 U.S.C. § 1326(b) (emphasis added).[24]

Foreclosing the EPA from considering the amount and nature of aquatic life in the water bodies from which cooling water is drawn makes no sense under Section 316(b). As the EPA explained, "because of the location of the intake, the characteristics of a particular waterbody, or the behavioral patterns of the fish or shellfish in that particular waterbody, there may be little or no impingement mortality or entrainment occurring at the site." 69 Fed. Reg. at 41,604. For example, at a nuclear power plant that draws cooling water from (as the EPA posited) a "highly degraded ship channel with few fish and shellfish," *id.* at 41,627, intake structure screens might be just as effective as cooling towers at minimizing adverse impacts on the virtually nonexistent aquatic life.

There is also no reason why the EPA should not be permitted to determine whether energy supply, other environmental, or monetary costs from using a particular technology outweigh the benefits to aquatic life at a particular location. The adverse impacts caused by retrofitting closed-cycle cooling at some nuclear plants—let alone forcing the closure of plants where retrofitting is impossible or infeasible—might well unambiguously outweigh benefits to aquatic life, particularly where those benefits would be unusually small. Such deci-

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[24] The effluent limitation provisions call for the EPA to set standards based on the "degree of effluent reduction" attainable. *See, e.g.*, 33 U.S.C. §§ 1314(b)(2)(A), 1316(a)(1); *see also id.* § 1311(b)(2)(A) (requiring EPA to set standards that "will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants").

sions, applying general policies in light of the specific circumstances of particular sites or situations, are classically ones best made by expert agencies in the implementation of their statutory mandate. This Court should reaffirm the EPA's ability to take the same approach under Section 316(b).

CONCLUSION

The judgment of the court of appeals should be reversed in relevant part.

Respectfully submitted.

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